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Fish Stocking Assessment Of Dina Lake #1, 1998

R. J. Zemlak
March 1999

PWFWCP Report No. 194

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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DINA LAKE #1

WATERSHED:	Parsnip River
DATE OF SURVEY:	July 8 and 9, 1998 October 14 and 15, 1998
FIELD CREW LEADER:	Randy J. Zemlak
FIELD ASSISSTANT:	Arne R. Langston

PEACE/WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

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FISH AND WILDLIFE BRANCH

REPORT PREPARED BY: RANDY J. ZEMLAK

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INTRODUCTION

Dina Lake #1, located near Mackenzie BC, is the largest of a chain of ten lakes (Figure 1). The lake has received significant attention over the past 19 years from fish biologists with both the Ministry of Environment, Lands and Parks (MELP) and the Peace/Williston Fish and Wildlife Compensation Program (PWFWCP). Brook trout have been stocked discontinuously in Dina Lake #1 since 1980, while rainbow trout have been stocked annually since 1987. A standard fisheries baseline reconnaissance level survey of Dina Lake #1 was conducted by the Water Management Branch in 1983 (Grant 1983). In June 1991, the lake was surveyed by PWFWCP fish biologists to identify potential fisheries enhancement projects, and to determine if changes to the stocking program were required (McLean 1991). BC Environment developed a Fisheries Management Plan in February 1992 for the Dina Lakes chain (Jesson 1992). All of the above reports can be viewed at the PWFWCP office (address on cover page).

In 1998, Dina Lake #1 was targeted as a high priority for a fish stocking evaluation (the last assessment was in 1991) as part of the stock assessment program for the Omineca Region. During July and October 1998, PWFWCP fish biologists investigated Dina Lake #1 primarily to evaluate the success of the current fish stocking program.

LAKE LOCATION

Location:	25 km north/northwest of Mackenzie BC
Elevation:	± 686 m
Latitude/Longitude:	55° 31' 35" : 123° 18' 30"
U.T.M.:	10.480658.6153999 (NAD 1983)
Management Unit:	7-30
N.T.S. Map No.:	93-O/11
Watershed:	Parsnip River
Waterbody Identifier:	00357PARA
Lake Drainage:	one permanent inlet (from Dina #2), no outlet (closed)

ACCESS

Although access to Dina Lake #1 has not changed significantly since the original reconnaissance level lake inventory (1983), exact road directions and conditions have changed over time. From the Alexander Mackenzie Hotel in Mackenzie (0.0 km), drive north on the Mackenzie Boulevard/Finlay Forks Forest Service Road. At 0.4 km, drive straight through the 4 way intersection. At 7.5 km, the road changes from a two lane paved road to a two lane gravel (2wd) road. At 8.4 km, cross Morfee Creek bridge. At 9.5 km, there is a four way intersection. Stay straight on the Parsnip West Forest Service Road. At 10.0 km, cross the Mugaha Creek bridge. At 10.4 km, stay right at this three

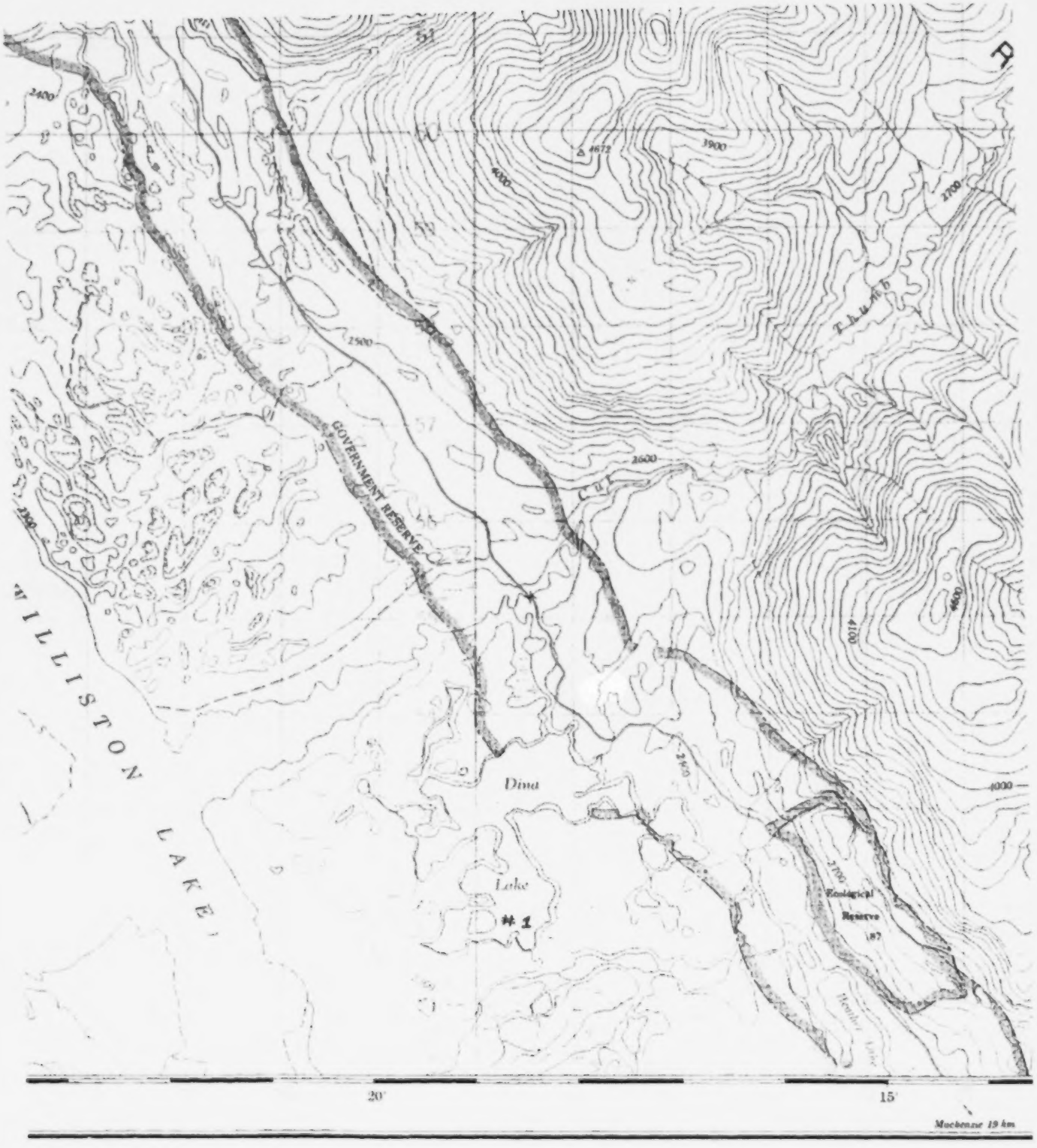

Figure 1. Location of Dina Lake #1.

way intersection. At 15.8 km, cross Tutu Creek bridge. At 19.7 km, go straight, do not go right on the Tony Creek M.L. road. At 20.4 km, cross Tony Creek bridge. At 21.8 km, stay straight (road on left to Heather Lake). At 27.8 km, cross Dina Creek culvert (inlet to Dina Lake #1). At 28.3 km, turn left onto Dina Lake #1 access road (single lane, gravel road, 2wd). Drive another 0.4 km to the car top boat launch.

STOCKING HISTORY

Brook Trout

Dina Lake #1 was initially stocked with 30,000 brook trout in 1980 (Table 1). According to the Release Records Database (MELP), brook trout were the first species of fish to be stocked in Dina Lake #1. The stocking program for this species has been sporadic in terms of numbers ranging from as low as O in some years (1982 - 1986, and 1988 - 1990) and as high as 31,235 fish stocked in 1991. Only one type of stock (Aylmer) has been introduced into the lake.

Table 1. Dina Lake #1 brook trout stocking history.

YEAR	NUMBER	SIZE (g)	LIFE STAGE	STOCK
1980	30,000	3.4	fry	Aylmer
1981	15,000	2.6	fry	Aylmer
1987	5,000	1.9	unknown	Aylmer
1991	31,235	3.1	fingerling	Aylmer
1992	15,019	2.4	fingerling	Aylmer
1993	20,000	3.4	fingerling	Aylmer
1994	20,000	3.9	fingerling	Aylmer
1995	20,000	3.8	fingerling	Aylmer
1996	20,000	3.9	fingerling	Aylmer
1997	12,500	3.3	fingerling	Aylmer
1998	15,000	4.4	fingerling	Aylmer
1998	5,000	4.7	fingerling	Aylmer

An average of approximately 20,000 brook trout have been stocked on a per year basis for the last eight years. The average size of these fish has been about 3.4 g.

Rainbow Trout

Dina Lake #1 was initially stocked with 20,000 rainbow trout in 1987 (Table 2). Stocking numbers have been relatively consistent with an average of 20,000 yearlings stocked every year between 1987 and 1998, although many different types of stocks have been introduced. The average size of these stocked fish has been approximately 9.0 g.

Table 2. Dina Lake #1 rainbow trout stocking history.

YEAR	NUMBER	SIZE (g)	LIFE STAGE	STOCK
1987	20,000	12.8	yearling	Tunkwa
1988	25,000	11.0	yearling	Tunkwa
1989	20,000	10.2	yearling	Tunkwa
1990	20,000	16.6	yearling	Badger
1991	20,000	5.1	yearling	NRT Premier
1992	20,000	6.6	yearling	NRT Premier
1993	20,000	2.9	yearling	Tunkwa
1994	20,016	10.4	yearling	Tunkwa
1995	20,000	11.0	yearling	NRT Genier
1996	20,000	4.6	yearling	Beaver
1997	20,000	9.3	yearling	Badger/Tunkwa
1998	20,000	6.9	yearling	Badger/Tunkwa

METHODS

In order to better assess the current fish status of Dina Lake #1, it was deemed necessary to conducted two surveys (one in July and one in October). Three different techniques were used to determine relative abundance of fish species in Dina Lake #1. Conversations with MELP fish biologists prior to the gill netting effort suggested that it would be valuable to have at least 30 fish sampled from each age group to accurately provide future recommendations to the stocking program. Therefore, it was deemed necessary to keep the nets in the water overnight. Two sinking monofilament experimental gill nets were set overnight. Each net consisted of six different sized mesh panels ranging from 25 to 85 mm. Each panel is 15.23 m long and 2.4 m wide. The gill nets were set in the same locations as in the 1983 and 1991 surveys to compare the catches between years. A second method used was Gee traps. Each Gee trap (four in total) was baited with sardines and set overnight. The Gee traps were set in the same locations as the previous two surveys in shallow (< 2 m) littoral habitat. The third technique used to capture fish was angling gear. A spin cast rod with an assortment of lures and a fly rod with dry flies were utilized.

The trout captured were measured for fork length and weight. A biological examination of the fish was conducted which revealed it's sex, maturity, stomach contents, and disease/parasite presence. Scale samples were collected for age determination and analysis was performed by North/South Consultants (Winnipeg, Manitoba). General appearance of the fish was determined through visual analysis. Photos of fish were taken. Mean lengths and weights were determined for each age class of rainbow trout. Condition factors ($Weight/Length^3 \times 100$) were determined for each individual fish and for each age class.

All other fish species were enumerated, and most were sampled for fork length and weight. General appearance of these fish was observed and recorded. Some fish were examined for

stomach content and sexual maturity. Any non-game fish captured that were still alive in the gill nets were released immediately.

The habitat features of Dina Lake #1 were briefly assessed. The entire perimeter of the lake was observed to confirm the lack of an outlet stream. The benchmark set during the original study (1983) was located. Changes to the current water level was measured with an Abney level, 1.5 m staff, and a 30 m Eslon tape. Any new campsites and other developments identified after the original survey in 1983 were also recorded. Photo documentation was taken of the lake.

On-site anglers were interviewed and catch per unit effort was recorded. Their catches were sampled in the same manner described above. Angling efforts by PWFWCP fish biologists were also recorded to determine additional catch per unit effort.

RESULTS

Gill Nets

Two overnight net sets on July 8, 1998 (Figure 2) yielded numerous rainbow trout and longnose suckers and very few brook trout (Appendix 1). Gill net #1, set for 24.0 hours, produced 62 rainbow trout, 135 longnose suckers, and 3 brook trout. Gill net #2, set for 27.5 hours, produced 112 rainbow trout, 170 longnose suckers, and zero brook trout. The nets were checked periodically throughout the day but contained few fish.

Rainbow trout were captured more frequently than brook trout (Table 3). The majority of rainbow trout captured in gill net #1 were age 1 class fish (54 of 62). All 62 rainbow trout were sampled, including scale samples taken for age analysis. In gill net #2, all but 5 of the 112 rainbow trout captured were presumed age 1 (no scales were analyzed for these age 1 fish). Approximately 50 % of the presumed age 1 fish were measured for fork length and weight. Almost all of the larger fish were caught in the panels located in deep (> 10 m) water (Plate 1).

The weather during July was quite warm and it appeared at this time that the brook trout could be inhabiting deeper water (out of reach of the gill net), where the water temperature would be much cooler than at the surface. As a result, with the very low numbers of brook trout captured and the low number of age 2 to 7 rainbow trout captured, it was deemed necessary to conduct a subsequent survey at a later date.

During-mid October 1998, a second gill netting effort was conducted on Dina Lake #1 (Table 3). Two gill nets were set overnight. Gill net #1 was set near shore for 25. 8 hours, while gill net #2 was set at 25 m in the deepest part of the lake for 27.4 hours (Appendix 1). Gill net #1 (located near shore) captured 218 longnose suckers, 23 rainbow trout, and 80 whitefish species. In gill net #2 (deep net set), only three longnose suckers were captured. No brook trout were captured in this second survey.

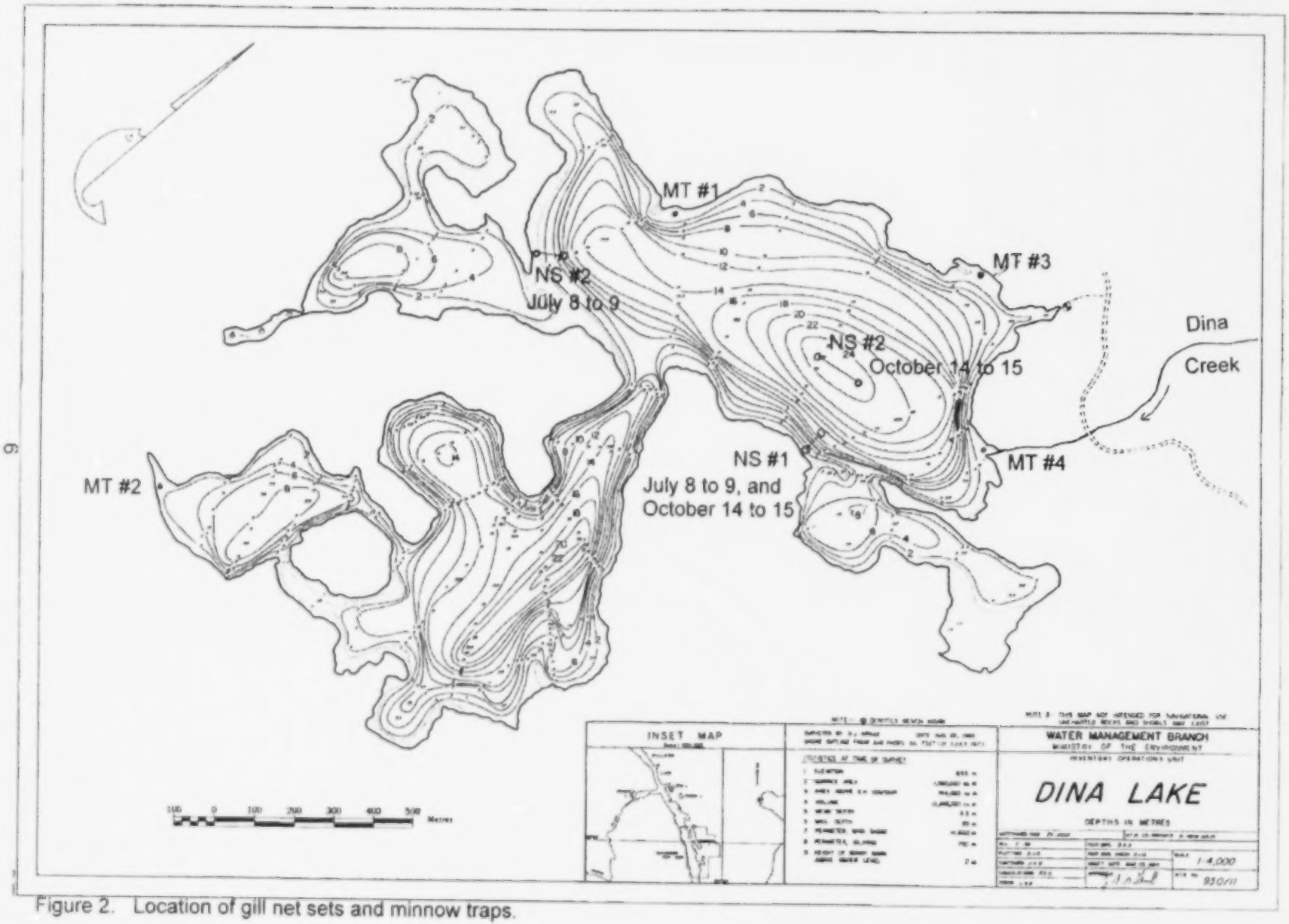

Figure 2. Location of gill net sets and minnow traps.

Plate 1: A rainbow trout (602 mm fork length, 2,412 g) caught in the deepest panel (15 m deep) of gill net #1, July 9, 1998.

Plate 2: Photo of the car top boat launch located on the northeast shore.

Table 3. Gill net catch summary for Dina Lake #1, 1998.

Date	Species	Net Site Number 1	Net Site Number 2	Angled	Total	Number Sampled	Number Preserved	Size Range (cm)
July 9	RB	62	112	4	178	122	0	10.2 - 60.2
July 9	EB	3	0	0	3	3	0	32.0 - 35.3
July 9	LSU	135	170	0	305	20	0	11.0-38.1
Oct. 15	RB	23	0	0	23	19	0	13.0 - 51.5
Oct. 15	EB	0	0	0	0	0	0	N/A
Oct. 15	PW	80	0	0	80	80	3	12.0 - 13.0
Oct. 15	LSU	218	3	0	221	15	0	13.0 - 39.6

The fall netting effort revealed a whitefish species being caught in Dina Lake #1 for the second time since 1983. All whitefish were captured in the 25 mm sized panel (near shore). Of the 80 fish captured, 77 were examined to determine sex and maturity; all were mature females with ripe eggs. Since the emphasis of this survey was on brook and rainbow trout, whitefish scale samples were not taken and only a range of fork lengths was obtained (12 to 13 cm). Three fish were taken as voucher samples, two of which were sent to Dr. J.D. McPhail (U.B.C. Fish Museum) for identification. Upon examination, Dr. McPhail verified the samples as pygmy whitefish.

Age determination for all brook trout and most of the rainbow trout was received by North/South Consultants (Appendix 2). Prints of the scales and age markings were provided for each fish, and reviewed by PWFWCP fish biologists. No obvious errors were detected, although age classes 6 and 7, which had small sample sizes, had a large range in lengths and weights (Table 4). Mean lengths and weights (Table 4), and condition factors were calculated and are compared to the 1991 survey results (Table 5, Figures 3 to 8).

Table 4. Population characteristics of rainbow trout in Dina Lake #1, 1998.

Age Class	Sample No.	Mean Length (cm)	Range of Length (cm)	SD for Length	Mean Weight (g)	Range of Weight (g)	SD for Weight
1	54	12.2	10.2 - 14.1	0.89	21.8	14.8 - 35.9	4.91
2	3	16.4	15.2 - 18.1	1.50	47.2	34.8 - 70.5	20.17
3	7	28.0	22.5 - 38.6	5.53	283.2	131.7 - 716.8	202.69
4	11	32.5	28.8 - 38.1	3.54	374.8	228.3 - 635.8	132.38
5	9	37.1	30.2 - 46.9	5.19	597.2	296.8 - 1134.5	272.06
6	4	44.8	31.2 - 60.2	13.45	1243.2	306.0 - 2412.0	983.54
7	2	46.5	39.4 - 53.5	9.97	972.2	659.3 - 1285.0	442.44

Table 5. Condition factors for rainbow trout captured in Dina Lake #1 in 1991 and 1998.

Condition Factor	1991 Survey Results	1998 Survey Results
Number of fish	50	90
Mean C.F.	1.01	1.14
Minimum C.F.	0.49	0.82
Maximum C.F.	1.29	1.42
Standard Deviation	0.17	0.12

Lake: Dina #1

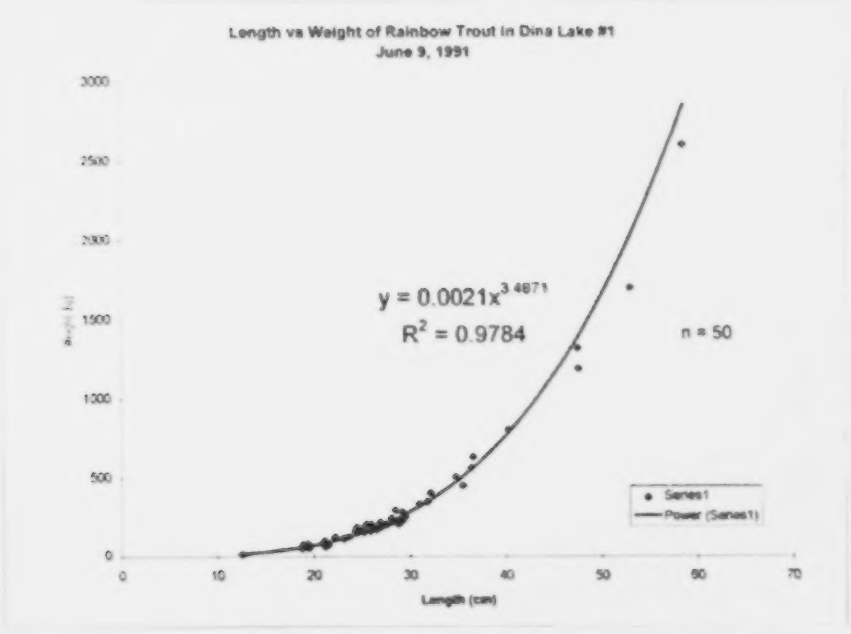

Figure 3. Length versus weight of rainbow trout in Dina Lake #1, 1991.

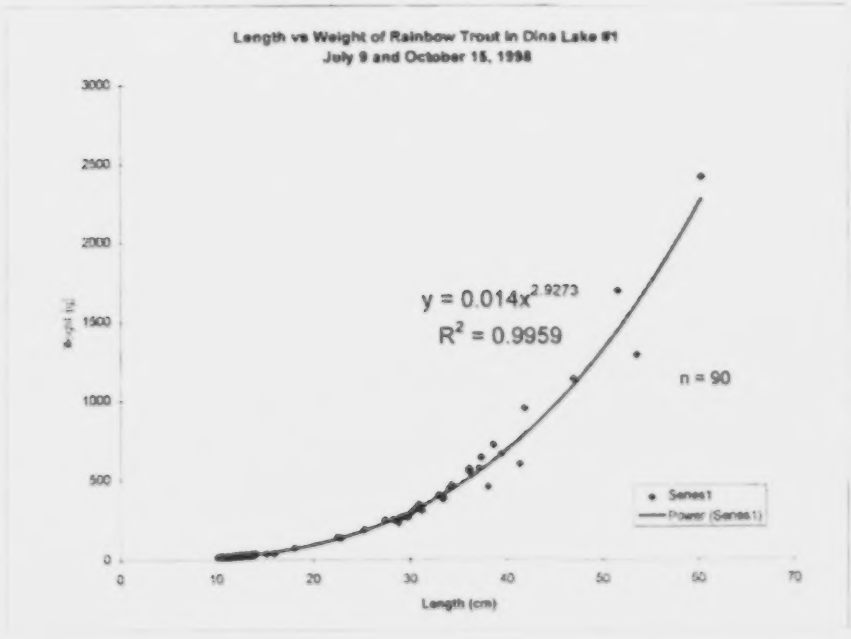

Figure 4. Length versus weight of rainbow trout in Dina Lake #1, 1998.

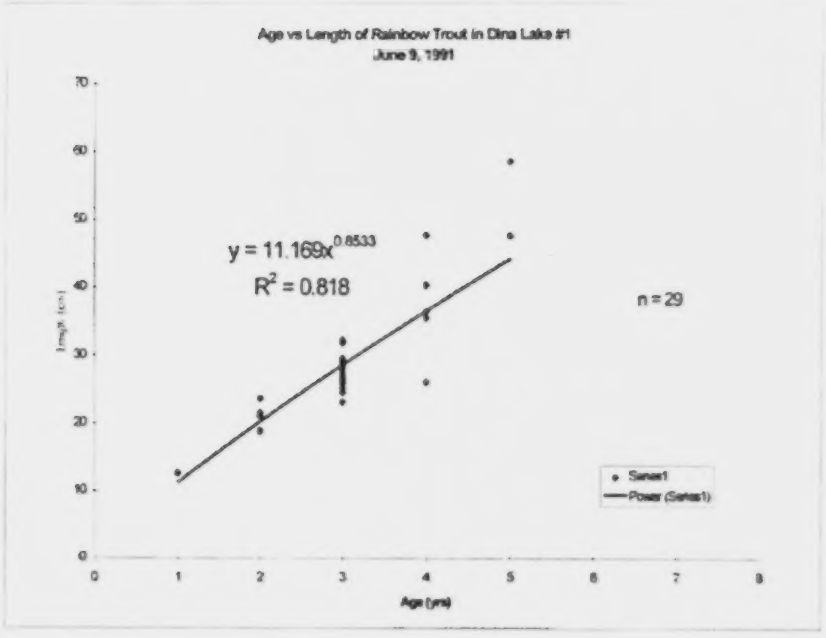

Figure 5. Age versus length of rainbow trout in Dina Lake #1, 1991.

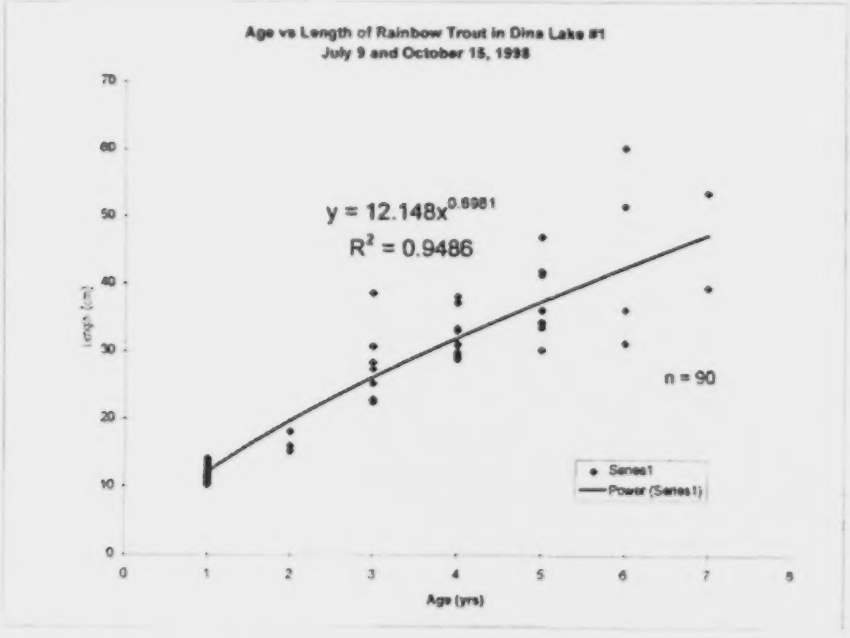

Figure 6. Age versus length of rainbow trout in Dina Lake #1, 1998.

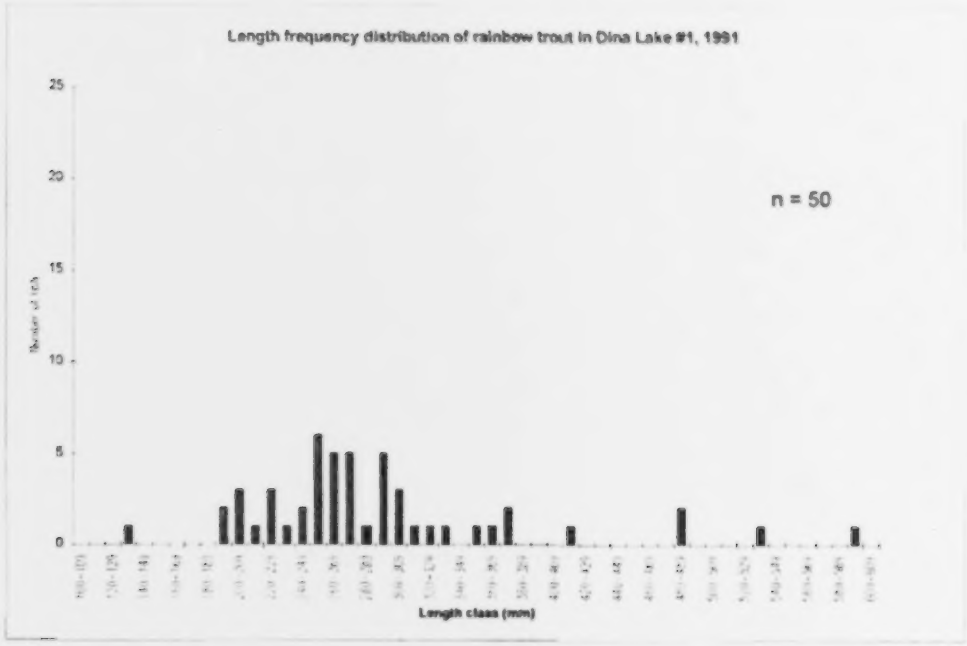

Figure 7. Length frequency distribution of rainbow trout in Dina Lake #1, 1991.

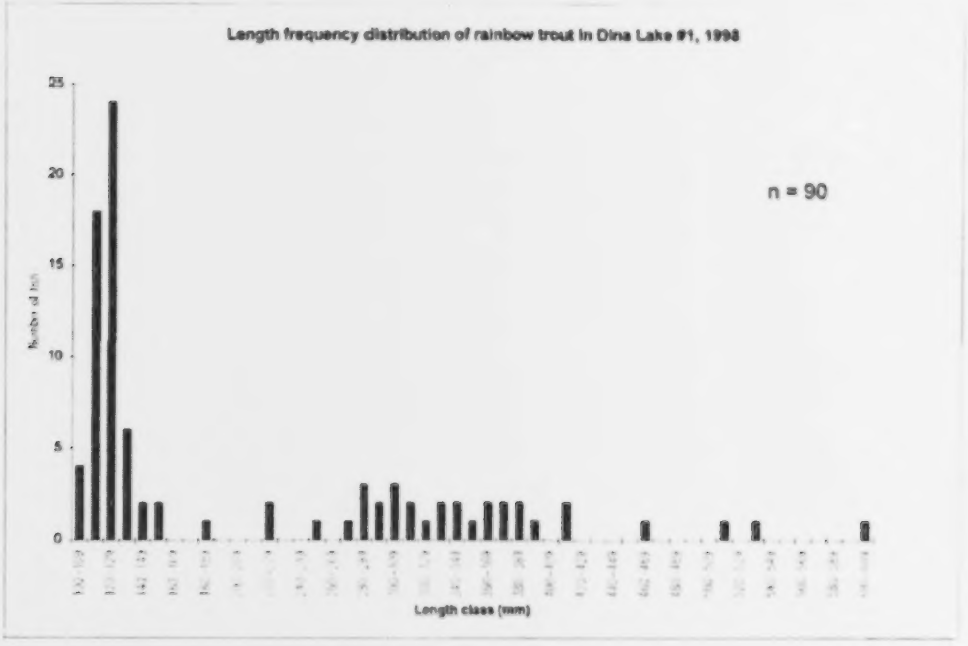

Figure 8. Length frequency distribution of rainbow trout in Dina Lake #1, 1998.

Gee Traps

Four Gee traps were used to capture juvenile fish. The traps were set overnight (Figure 2) for a minimum of 28 hours (Table 4). Three species of fish were captured: lake chub, longnose sucker, and rainbow trout. No brook trout were caught in the Gee traps.

Table 4. Gee trap results.

Trap No.	Hours fished	Depth (m)	Substrate	Species	Number	Size Range (mm)
1	29.25	1.20	LWD[1]/organics	RB	1	114
				LSU	4	73 - 79
				LKC	217	45 - 78
2	29.50	0.83	LWD/organics	LSU	4	76 - 109
			and aquatic veg.	LKC	120	46 - 82
3	28.75	0.90	LWD/SWD[2]	RB	1	102
			and organics/mud	LSU	2	71 - 76
				LKC	30	45 - 91
4	28.80	0.85	LWD/SWD	LSU	5	68 - 125
			and organics/algae	LKC	186	60 - 89

[1]LWD = large woody debris, [2]SWD = small woody debris

Angling

On July 8, PWFWCP fish biologists angled for 1.5 hours using two rods, and caught two rainbow trout. Catch per unit effort is 0.7 fish per rod hour. On July 9, two local area residents angled on Dina Lake #1 for four hours each. Both fishermen used bait cast rods and an assortment of flies and lures. The anglers caught 9 rainbow trout (released 6 and kept 3), for a catch per unit effort of 1.1 fish per hour. All three fish they kept were processed; the largest was a male 535 mm long and weighed 1,285 g.

During mid-May 1998, local Mackenzie residents holding a private fishing derby at Dina Lake #1 were interviewed by PWFWCP fish biologists. Eighteen rainbow trout were captured in 37 rod hours, resulting in a catch per unit effort of 0.5 fish per rod hour. The size of these fish ranged from 454 g to approximately 900 g.

BIOLOGICAL ANALYSIS OF RAINBOW TROUT

A biological analysis was conducted on approximately 30 rainbow trout (Appendix 2). About one third were males and two thirds were females. Reproductive organ analysis revealed that most fish were mature, with a few immature or spent. Three of the females had reabsorbed eggs in the body cavity. Examination of stomach contents suggest that rainbow trout are preying primarily on other fish species, particularly pygmy whitefish. Other common foods included: *Trichoptera* and *Gammarus,* while Zooplankton and snails

were observed in only a few fish. External examination indicated healthy fish while internal examination revealed some tapeworms and parasites in their stomachs.

DRAINAGE

Dina Lake #1 has one permanent inlet located on the northeast shore. This inlet creek was enhanced by program staff in 1992 and 1993 by conducting habitat complexing to further increase the reproductive potential of the salmonids in Dina Lake #1 and #2. Approximately 600 m of stream was channeled out and replaced with rip rap to stabilize the banks and spawning gravel was added to improve spawning substrate. This stream offers excellent spawning potential for brook and rainbow trout. A small barrier was added to the bottom of the stream to keep all non-game fish out. This creek is maintained each spring by PWFWCP fish biologists by adding additional spawning gravel and adjusting weirs to accommodate current water flows. At the time of this survey, the creek did not flow into the lake with any great velocity. As a result, spawning fish may have trouble detecting the location of this creek mouth to spawn.

Dina Lake #1 is a closed system (no outlet). Because of this criteria, non-native fish species of the Williston Watershed like brook trout could be stocked into this lake. If the lake were to rise substantially and form an outlet, this would provide access for brook trout to escape the Dina system and possibly impact other systems with native fish. The entire shoreline perimeter of this lake was observed to determine if the lake level had risen over the years and possibly spilled into another system; however, no overflow areas were found. The area of most concern (potential future outlet) exists at the northwest shore, which is close to a swamp that flows into Dina Lake #10. The distance between Dina Lakes #1 and #10 is 50 m. The water level in Dina Lake #10 is about 3 m lower than Dina Lake #1. The water level in Dina Lake #1 would have to rise 83 cm before flowing into Dina Lake #10.

A second site of concern is located along the northeast shore near the boat launch. A small swamp exists on the west side of the boat launch and water from Dina Lake #1 fills this swamp when the water level is high. At the time of this survey, water has flown into this swamp from the lake. The water level in this swamp would have to rise another 96 cm before topping it's banks and flowing out the other side, thereby creating an outlet. Current 1:50,000 NTS maps (NAD 1927) show an outlet here which is incorrect.

BENCHMARK

The benchmark, located on the northeast shore, was re-located by PWFWCP fish biologists during the 1998 survey (Figure 2). This benchmark was originally set in 1983, 2.0 m above the lake water level. The 1991 survey revealed that the water level dropped 10 cm from the 1983 date. In 1998, the water level was at 1.45 m, indicating a 45 cm drop from 1991. The benchmark was re-painted orange. This benchmark is located in a 30 cm D.B.H. white spruce tree, 90 cm from the current water level at the time of this survey.

FISHERIES MANAGEMENT COMMENTS

Rainbow Trout

Dina Lake #1 supports a healthy population of stocked rainbow trout; however the number of fish captured in the overnight net set appears low for the number of fish stocked each year. Angling pressure on this lake is presumed high and may have removed a substantial portion of these stocked fish over time. The high number of yearling rainbow trout captured in the first panel of both gill nets in July, was likely from the lake stocking in June (one month earlier).

The net catch per unit effort for two year old fish and older was higher in 1991 than compared to the 1998 results. In 1991, after four years of stocking, gill net #1 yielded 1.13 rainbow trout per net-hour while gill net #2 yielded 3.54 rainbow trout per net-hour. In July 1998, gill net #1 produced 0.46 rainbow trout per net-hour while gill net #2 produced 0.18 rainbow trout per net-hour. In addition, in October 1998, gill net #1 yielded a better catch rate of 0.81 rainbow trout per net-hour as compared to the earlier netting in this year. Although these nets were set in the same locations between years, the dates the nets were set are different and the soak times were different. Overall, the number of catchable sized fish caught in the gill nets were higher in 1991 than compared to the 1998 catch.

Few rainbow trout were spawnbound. Since the lake level has fallen more than a 1/2 meter from 1983 to present, the mouth of the inlet creek has the same characteristics as an alluvial fan. The very slow flow of this stream below the non-game fish barrier appears to be difficult for fish to detect. The water depth here is approximately 30 cm and extends from the non-game fish barrier out to the lake for about 40 m before dropping off (getting deeper). The rainbow trout that do detect this stream do not appear to be restricted by the barrier. Over the last couple of years, PWFWCP fish biologists have observed 200 - 400 adult rainbow trout in Dina Creek prior to spawning. Juvenile fish have been observed in the creek each year, but recruitment levels are unknown.

Comparing length versus weight between the 1991 and 1998 surveys revealed the 1991 rainbow trout were more rotund (Figures 3 and 4). Rainbow trout sampled from 1991 show a higher constant "b" value ($W = aL^b$) which indicate that these fish were more "chubby" than the 1998 sampled fish. However, a substantial portion of the fish captured in the 1998 survey were comprised of recently stocked fish (stocked one month earlier).

A small trend in condition factors is somewhat evident between the 1991 and 1998 data. Although the sample sizes are small between age classes, age 2 and 3 fish appeared to grow slower in 1991 than in 1998 (McLean 1991). In contrast, fish ages 4 and 5 had greater condition factors in 1991 than in 1998. The addition of natural recruitment from Dina Creek may lead to the reason why there are possible differences in growth rates between the 1991 and 1998 captured rainbow trout.

The growth of rainbow trout appears to be slower in 1998 as opposed to the 1991 fish. It is unknown why but, there are a few possible explanations. First, there was a difference in equipment being used to measure the weights of fish. In 1991, a hand held spring balance (measured to the nearest 5.0 g) was used to weigh fish, while in 1998, an electronic balance (measured to the nearest 0.1 g) was used. It could be argued that it is possible that either device could over or underestimate the weights of fish in a particular situation (i.e. windy day, weakened spring, low battery power). Second, during 1991, there was no recruitment to Dina Lake #1; therefore, all rainbow trout grew up in the lake where food appears more plentiful. In 1998, there was natural recruitment and some of the fish captured (aged 2 to 7) could have reared in Dina Creek for a number of years. The creek does not offer the same abundance of food as the lake does. Fish inhabiting the creek would be limited to a certain size and would eventually be forced to migrate to the lake to grow. Therefore, fish rearing in the creek would tend to grow slower than fish rearing solely in the lake.

With these above assumptions, it is recommended that the fish in the creek be further surveyed by electroshocking. Captured fish should be sampled to determine growth and age. By sampling these fish, it will provide an indication of recruitment the creek is producing and an indication as to whether these natural juvenile fish are rearing in the creek and exhibiting a presumed slower growth rate.

Brook Trout

Dina Lake #1 currently supports a small population of stocked brook trout. The few fish captured during July were suspected to be due to the warm water temperatures which may have forced most of the fish into deeper waters, out of reach of the gill nets. However, the deepest part of the water was fished during the second capture effort in October, but no brook trout were captured.

Only three brook trout were captured between the July and October netting efforts; however, they were healthy and of a significant size (428g - 571 g). Two of the trout were preying primarily on other fish (lake chub or longnose suckers) at the time. It is unknown why the brook trout population appears to be suppressed in this lake. The stocked fingerling brook trout may not be able to compete with the mature pygmy whitefish discovered in the lake or the stocked rainbow trout. It is unknown why no fingerling brook trout were captured in the July gill nets, but the yearling rainbow trout were plentiful. It is possible that the smaller stocked brook trout were small enough at the time to swim through the 25 mm panel and not get caught, while the larger hatchery rainbow trout were caught.

Spawning brook trout may have difficulty detecting the stream mouth when the water levels are low. Over the last couple of years, PWFWCP fish biologists have observed as many as 200 adult brook trout preparing to spawn in Dina Creek in any given year. Juvenile brook trout have been observed in the creek, but survival levels to maturity are unknown.

Non-game fish

Dina Lake #1 also supports populations of non-game fish including pygmy whitefish, longnose suckers, and lake chub. Although not studied intensively, all three populations were abundant and appear to be healthy. Since access to the only spawning stream available to these fish has been cut off, these fish have had no choice but to spawn in a possibly less-preferred lake habitat. However, prior to construction of the non-game fish barrier, the creek did have a history of impassable beaver dams on it. In addition, these non-game fish do thrive in other lakes where stream spawning habitat is absent suggesting they can reproduce within lakes.

MISCELLANEOUS COMMENTS

1. A fisheries management plan encompassing all ten of the Dina Lakes chain was produced by Duane A. Jesson, BC Environment Fisheries Branch, Prince George, BC in February 1992.

2. During the early 90's, an "engine power restriction" (7.5 kw or 10 hp) was proposed (Plate 2) for Dina Lake #1. The concept was accepted by Ken Stewart, Rafting and Boating Regulations Officer, on August 26, 1993. The sign was erected at the boat launch site in 1994.

3. Also during 1993, a car top boat launch (Plate 2) was developed on the northeast shore by the BC Forest Service.

4. Photographs of Dina Lake #1 were taken of some fish species and the surrounding habitat. Most photos were taken to document the change in features over time (i.e. habitat) and are not significant to the relevance of this report on fish stocking. Therefore, these photos are not displayed in this fish stock assessment report but can be viewed at the address indicated at the beginning of this report.

5. The PWFWCP completed intensive habitat improvements to the one permanent inlet to Dina Lake #1 (Dina Creek) in 1992 and 1993. Phase 1 (1992) involved: beaver dam breaching, non-game fish barrier construction, silt and sand removal, and habitat complexing. Phase 2 (1993) involved: spawning gravel addition, channeling/rip rap additions, and more habitat complexing. Photos of this stream habitat and of returning spawning brook and rainbow trout have been taken by PWFWCP fish biologists over the past 5 years. All photos are located at the PWFWCP office in Prince George.

6. The 1983 reconnaissance level survey indicated the presence of redside shiners present in Dina Lake #1. In the 1991 report, field staff assumed this previous statement to be true and reported their catch as the same species. In 1998, it was deemed that these fish were incorrectly identified, and were in fact lake chub.

7. The 1991 survey report indicated one mountain whitefish was captured. Given the abundance of pygmy whitefish in the 1998 survey, it appears that this mountain whitefish captured in 1991 was also likely misidentified and should have been reported as a pygmy whitefish instead.

8. Black bears were observed many times in Dina Creek during the spring spawning period for rainbow trout (May/June 1998). The number of fish captured by bears, and the resulting loss of recruitment to the system is unknown. With their repeat appearances at the stream, there inevitably had to be some loss of adult rainbow trout from Dina Creek and ultimately the lake.

FISH STOCKING PROGRAM

Rainbow Trout

The current rainbow trout stocking program in Dina Lake #1 appears to be adequate but still requires future investigation to address a few unanswered questions. The amount of natural recruitment produced by Dina Creek in a given year also remains undetermined. The creek appears to have alleviated the spawnbound problem for most rainbow trout; however, some female fish still retained some eggs. Understanding the catch per unit effort would assist with the recommendations to the stocking program. An accurate count of anglers on Dina Lake #1 is impossible to know with any certainty. It is unknown what species of game fish anglers are targeting for and a future creel survey may help determine this answer. A winter fishery exists on this lake as well. Again, the number of anglers and their catch is unknown. Future data collection on all of these points will help assist with the stocking recommendations for Dina Lake #1.

From the fish captured in the 1998 survey, there appears to be no evidence of stunting. The condition factor for the 1998 fish (except age 1 hatchery fish) was 1.09 (n = 36) while the 1991 survey results revealed a slightly lower condition factor of 1.01 (n = 50). These results indicate there is no problem with overpopulation as these fish are able to grow rounder with time, although the length at age data shows a slower growth rate in 1998 compared to 1991. A possible explanation here is that some of the 1998 fish captured could have reared for a period in Dina Creek thereby putting on less growth than what could be achieved by rearing solely in the lake. Between the two gill netting efforts in 1998, there were only 24 catchable sized fish caught (over 200 mm fork length). Based on these results, the stocking rate of 20,000 fish should not be reduced and appears adequate at this time.

With the recommendation to cease stocking of brook trout in Dina Lake #1 (see below), additional food may be provided and competition would be reduced for the rainbow trout. A future stocking program evaluation is recommended in 2002. It is anticipated that more catchable rainbow trout should be observed due to the elimination of the brook trout stocking. If there is no change in the 2002 survey results, then it may be warranted to

determine the amount of recruitment Dina Creek is producing, and adjust the stocking numbers accordingly. Future anecdotal information received with time may provide a better idea of the angler use and catch per unit effort on Dina Lake #1, and would assist in better recommendations to the stocking program.

Brook Trout

The current stocking of brook trout in Dina Lake #1 appears to have been unsuccessful. Many possible explanations for their apparent inability to establish a population exists. Since only three adult brook trout were captured, it is difficult to make any certain inferences regarding the status of the population. Brook trout are generally short lived fish, three to five years and sometimes up to eight years. Although it is unknown why the stocking has been unsuccessful, it is presumed that these fish are not surviving in their early life stages. A critical period for brook trout survival is over the first winter. The summer and fall productivity of the lake must be sufficient to allow the fry to reach a size that maximizes overwinter survival. In addition, the large piscivorous rainbow trout could be preying on the smaller hatchery brook trout.

No one-year-old brook trout were captured from the previous months stocking (June 1998), although rainbow trout stocked at the same time were captured. Since the mean size at stocking of these two fish were different (4.4 g for brook trout and 6.9 g for rainbow trout) it is possible the smaller brook trout were too small to get captured in the 25 mm panel while the larger rainbow trout did.

Habitat requirements for brook trout may also be a key to their lack of success in Dina Lake #1. It is possible that the juvenile brook trout were occupying a deeper niche than the rainbow trout. If the brook trout are down deep (5 - 7 m), they could be in competition with the pygmy whitefish which potentially occupy this same area of the lake. This could also explain why the larger mesh panels, occupying the deeper water column, did not catch these fish. It is recommended that the stocking of brook trout in Dina Lake #1 be ceased. By ceasing the stocking of brook trout, additional food and habitat resources may be provided for the rainbow trout.

OTHER RECOMMENDATIONS

Dina Creek is maintained each year by the PWFWCP fish biologists so returning fish have adequate flow and substrate available to spawn. However, recruitment numbers and survival rates from the creek are still unknown. Understanding the productivity of the lake would also help identify if there are enough critical food sources available for the stocked trout in their first year of development. In addition, further understanding the life cycle of the pygmy whitefish and how it plays a role in the food chain in Dina Lake #1 would be beneficial. It appears that the larger rainbow and brook trout were keying in on pygmy whitefish as a food source at the time of the survey.

LITERATURE CITED

Grant, D. J. 1983. A reconnaissance survey of Dina Lake #1. Water Management Branch, Ministry of Environment, Prince George, B.C. 16pp plus appendicies.

Jesson, Duane A. 1992. Fisheries management plan for the Dina Lakes. B.C. Environment, Fisheries Branch, Prince George, B.C. 18pp plus appendicies.

McLean, A.R. 1991. Fish habitat enhancement potential and stocking assessment of Dina Lake #1. Peace/Williston Fish and Wildlife Compensation Program Report No. 117. 13pp plus appendicies.

Lake: Dina #1

APPENDIX 1

Netting Record

Lake: Dina #1

NETTING RECORD **July 8 and 9, 1998**

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE #1

Type:	Sinking monofilament gill net		
Date Set:	July 8, 1998	Time:	1030 hrs
Date Lifted:	July 9, 1998	Time:	1030 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4m
Shallow End Mesh Size:	25 mm	Depth: Substrate:	1.5m veg./LWD
Deep End Mesh Size:	64mm	Depth: Substrate:	15.0m organics

Comments:

Set in the same location as the 1983 and 1991 surveys. Net was checked at 15 45 hrs on July 8. Looked at the first three panels and it had 7 RB in it; therefore, left in overnight. Gill net #1 produced 62 rainbow trout, 135 longnose suckers, and 3 brook trout.

NETTING SITE #2

Type:	Sinking monofilament gill net		
Date Set:	July 8, 1998	Time:	1100 hrs
Date Lifted:	July 9, 1998	Time:	1430 hrs
Net Dimensions:	Length: 91.4m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth: Substrate:	1.6 m veg./organics
Deep End Mesh Size:	64mm	Depth: Substrate:	5.0m mud/organics

Comments:

Set in the same location as the 1983 and 1991 surveys. Net was checked at 15 40 hrs on July 8. Looked at and could see all six panels, contained approximately 80 fish (rainbow trout and suckers), left in overnight for more rainbow samples. Gill net #2 produced 112 rainbow trout, 170 longnose suckers, and zero brook trout.

Lake: Dina #1

NETTING RECORD **October 14 and 15, 1998**

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE #1

Type:	Sinking monofilament gill net		
Date Set:	October 14, 1998	Time:	1010 hrs
Date Lifted:	October 15, 1998	Time:	1200 hrs
Net Dimensions:	Length: 91.4m	Depth:	2.4m
Shallow End Mesh Size:	25 mm	Depth:	1.5m
		Substrate:	organics/twigs
Deep End Mesh Size:	64 mm	Depth:	15.0m
		Substrate:	organics

Comments:

Set in the same location as the 1983 and 1991 surveys. Net was set but not checked until the next day. Gill net #1 captured 218 longnose suckers, 23 rainbow trout (4 released alive), and 80 pygmy whitefish. No brook trout were captured.

NETTING SITE #2

Type:	Sinking monofilament gill net		
Date Set:	October 14, 1998	Time:	1030 hrs
Date Lifted:	October 15, 1998	Time:	1355 hrs
Net Dimensions:	Length: 91.4m	Depth:	2.4m
Shallow End Mesh Size:	25 mm	Depth:	25.0m
		Substrate:	organics
Deep End Mesh Size:	64 mm	Depth:	26.0m
		Substrate:	organics

Comments:

Net was set in the deepest part of the lake. Net was set but not checked until the next day. Gill net #2 captured only three longnose suckers. No brook or rainbow trout or pygmy whitefish were captured.

APPENDIX 2

Individual Fish Data

Lake: Dina #l

INDIVIDUAL FISH DATA

Date Captured: July 9, 1998
Gill Net #1

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = W / L3 x 100

Species	Fork Length (cm)	Weight (grains)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
EB	35.3	571.5	1.2992	MG	F	2						empty
EB	34.1	563.1	1.4201	MG	M	2				2		suckers
EB	32.0	428.6	1.3080	MG	F	3				1		chub
RB	31.2	306.0	1.0075	IMM	F	6				25		small
RB	28.8	228.3	0.9557	IMM	M	4				some	detritus	small
RB	22.5	136.1	1.1948	IMM	F	3		zoo			ant	
RB	30.9	343.0	1.1626	MT	F	4				some	T.W.	small
RB	28.9	258.1	1.0693	IMM	M	4				bone	G.	
RB	33.4	377.1	1.0121	MT	M	4				yes		
RB	46.9	1,134.5	1.0997	SP	M	5				big	T.W.	trout
RB	60.2	2,412.0	1.1056	SP	M	6				parts	T.W.	?
RB	12.5	20.1	1.0291	IMM	?	1	(did not	open up	these	age	1	fish below)
RB	11.8	19.6	1.1929	IMM	?	1						
RB	12.6	21.9	1.0948	IMM	?	1						
RB	12.6	23.9	1.1948	IMM	?	1						
RB	12.5	22.9	1.1725	IMM	?	1						
RB	14.1	33.7	1.2022	IMM	?	1						
RB	13.2	29.1	1.2652	IMM	?	1						
RB	12.4	21.5	1.1276	IMM	?	1						
RB	12.6	18.5	0.9248	IMM	?	1						

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Dina #l

INDIVIDUAL FISH DATA

Date Captured: July 9, 1998
Gill Net #1

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = W / L3 x 100

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
RB	11.6	18.9	1.2108	IMM	?	1						
RB	12.6	25.9	1.2948	IMM	?	1						
RB	11.8	18.8	1.1442	IMM	?	1						
RB	12.0	21.5	1.2442	IMM	?	1						
RB	13.0	25.9	1.1789	IMM	?	1						
RB	13.8	28.0	1.0654	IMM	?	1						
RB	13.2	27.1	1.1783	IMM	?	1						
RB	12.5	19.9	1.0189	IMM	?	1						
RB	13.0	27.5	1.2517	IMM	?	1						
RB	11.7	17.9	1.1176	IMM	?	1						
RB	12.1	20.3	1.1459	IMM	?	1						
RB	14.1	35.9	1.2807	IMM	?	1						
RB	11.3	18.1	1.2544	IMM	?	1						
RB	13.7	34.7	1.3495	IMM	?	1						
RB	12.0	20.9	1.2095	IMM	?	1						
RB	12.9	26.2	1.2205	IMM	?	1						
RB	12.5	22.4	1.1469	IMM	?	1						
RB	13.6	28.2	1.1211	IMM	?	1						
RB	10.2	15.1	1.4229	IMM	?	1						
RB	10.5	14.8	1.2785	IMM	?	1						

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Dina #1

INDIVIDUAL FISH DATA

Date Captured: July 9, 1998
Gill Net #1

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
RB	12.5	20.4	1.0445	IMM	?	1						
RB	12.5	22.7	1.1622	IMM	?	1						
RB	12.1	21.6	1.2193	IMM	?	1						
RB	13.3	25.8	1.0966	IMM	?	1						
RB	12.7	24.5	1.1961	IMM	?	1						
RB	11.3	17.5	1.2128	IMM	?	1						
RB	11.3	17.9	1.2406	IMM	?	1						
RB	12.2	21.3	1.1730	IMM	?	1						
RB	12.5	24.2	1.2390	IMM	?	1						
RB	11.4	17.7	1.1947	IMM	?	1						
RB	11.8	17.9	1.0894	IMM	?	1						
RB	12.8	22.0	1.0490	IMM	?	1						
RB	12.2	19.8	1.0904	IMM	?	1						
RB	11.5	15.1	0.9928	IMM	?	1						
RB	11.5	17.1	1.1244	IMM	?	1						
RB	11.5	17.2	1.1309	IMM	?	1						
RB	12.6	26.0	1.2998	IMM	?	1						
RB	11.4	18.8	1.2689	IMM	?	1						
RB	12.9	24.9	1.1599	IMM	?	1						
RB	11.8	19.4	1.1807	IMM	?	1						

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	Callibaetis
Le.	leeches						

Lake: Dina #1

INDIVIDUAL FISH DATA

Date Captured: July 9, 1998
Gill Net #1

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = W / L 3 x 100

Species	Fork Length (cm)	Weight (grains)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
RB	10.8	16.8	1.3336	IMM	?	1						
RB	10.6	16.5	1.3854	IMM	?	1						
RB	12.1	18.1	1.0217	IMM	?	1						
RB	11.1	17.4	1.2723	IMM	?	1						
RB	11.1	15.7	1.1480	IMM	?	1						

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Dina #1

INDIVIDUAL FISH DATA

Date Captured: July 9, 1998
Gill Net #2

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
RB	29.8	261.0	0.9863	MT	M	4						
RB	29.3	265.5	1.0555	MT	F	4						
RB	22.9	131.7	1.0967	IMM	M	3						
RB	30.7	320.8	1.1087	SP	F	3						
RB	25.3	184.5	1.1393	IMM	M	3						
RB	11.5	20.0		IMM	?	1	(did not	open up	these	age	1	fish below)
RB	12.0	18.9		IMM	?	1	(age is	presumed	based	on	size)	
RB	13.1	25.1		IMM	?	1	(no scale	taken)				
RB	12.8	26.3		IMM	?	1						
RB	14.6	31.8		IMM	?	1						
RB	12.4	23.3		IMM	?	1						
RB	12.9	24.4		IMM	?	1						
RB	13.0	26.5		IMM	?	1						
RB	13.6	30.0		IMM	?	1						
RB	13.3	26.2		IMM	?	1						
RB	12.6	25.1		IMM	?	1						
RB	13.4	27.5		IMM	?	1						
RB	13.3	27.1		IMM	?	1						
RB	14.5	36.2		IMM	?	1						
RB	12.7	24.9		IMM	?	1						

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Dina #1

INDIVIDUAL FISH DATA

Date Captured: July 9, 1998
Gill Net #2

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grains)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
RB	12.0	19.0		IMM	?	1						
RB	11.9	20.3		IMM	?	1						
RB	11.8	22.7		IMM	?	1						
RB	12.9	23.0		IMM	?	1						
RB	12.3	20.3		IMM	?	1						
RB	13.5	26.8		IMM	?	1						
RB	12.5	23.3		IMM	?	1						
RB	12.8	24.0		IMM	?	1						
RB	11.7	21.8		IMM	?	1						
RB	11.5	20.1		IMM	?	1						
RB	12.8	24.7		IMM	?	1						
RB	11.5	19.6		IMM	?	1						
RB	14.2	31.1		IMM	?	1						
RB	13.7	30.0		IMM	?	1						
RB	13.7	30.5		IMM	?	1						
RB	11.7	19.7		IMM	?	1						
RB	12.8	28.0		IMM	?	1						
RB	12.3	20.3		IMM	?	1						
RB	13.7	29.9		IMM	?	1						
RB	12.2	21.6		IMM	?	1						

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	Callibaetis
Le.	leeches						

Lake: Dina #1

INDIVIDUAL FISH DATA

Date Captured: July 9, 1998
Gill Net #2

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = W / L3 x 100

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
RB	13.0	26.7		IMM	?	1						
RB	12.8	24.5		IMM	?	1						
RB	12.0	20.8		IMM	?	1						
RB	12.9	26.0		IMM	?	1						
RB	13.4	26.2		IMM	?	1						
RB	12.0	20.5		IMM	?	1						
RB	13.2	27.1		IMM	?	1						
RB	14.0	33.6		IMM	?	1						
RB	12.6	22.7		IMM	?	1						
RB	12.4	22.8		IMM	?	1						
RB	13.0	25.5		IMM	?	1						
RB	12.8	26.0		IMM	?	1						
RB	12.1	22.2		IMM	?	1						
RB	12.6	23.0		IMM	?	1						
RB	12.3	20.3		IMM	?	1						
RB	12.9	24.0		IMM	?	1						

Ch. chaoborus
Cl. clams
G. gammarus
Le. leeches
P.M. phantom midge
O.M. organic matter
L. lice
T.W. tapeworms
S. snails
M. mayflies (general)
Da. daphnia
Di. diptera
Ca. callibaetis

Lake: Dina #l

INDIVIDUAL FISH DATA

Date Captured: October 15, 1998
Gill Net #1

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
7 - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = $W / L^3 \times 100$

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
RB	30.2	296.8	1.0776	MT	M	5	worms				G.	
RB	18.1	70.5	1.1889	MT	M	2	detritus				G.	parasite
RB	33.0	400.8	1.1153	MT	F	4				yes	G.	
RB	31.1	331.7	1.1027	MT	M	4				yes	G.	
RB	36.0	561.4	1.2033	MT	F	5				yes		
RB	37.3	635.8	1.2252	MT	F	4					beetle	
RB	36.1	565.8	1.2027	MT	F	6				6		
RB	16.0	36.4	0.8887	IMM	F	2						empty
RB	34.1	442.5	1.1160	MT	F	5			Caddisfly		G.	snail
RB	33.5	385.4	1.0251	MT	F	5				yes	G.	
RB	28.3	248.1	1.0946	IMM	F	3				yes		pygmy
RB	36.1	546.3	1.1612	MT	F	5				yes		
RB	27.4	244.4	1.1881	MT	F	3					G.	
RB	39.4	659.3	1.0779	MT	F	7			Caddisfly			Spawnbound
RB	34.3	464.4	1.1508	MT	M	5				yes		
RB	38.6	716.8	1.2463	MT	F	3				5 pw		spawnbound
RB	15.2	34.8	0.9909	IMM	F	2						
RB	41.8	947.8	1.2977	MT	M	5	detritus					parasite
RB	51.5	1,689.0	1.2365	MT	M	6				yes		pygmy

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Lake: Dina #1

INDIVIDUAL FISH DATA

Date Captured: October 15, 1998
Gill Net #2

M - Male
F - Female
7 - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
ML - Milt
HD - Head
TG - Fish Tag
ST - Stomach

SC - Scale
FR - Fin Ray
OT - Otolith
WF - Whole Fish

Method of Capture: Sinking monofilament gill net.
Condition Factor (K) = W / L 3 x 100

Species	Fork Length (cm)	Weight (grams)	K	Gonadal Maturity	Sex	Age (yrs)	Stomach Contents					Comments
							Bottom Organisms	Plankton	Insects	Fish	Other	
LSU	26.5											released
LSU	27.9											released
LSU	28.8											released

Ch.	chaoborus	P.M.	phantom midge	T.W.	tapeworms	Da.	daphnia
Cl.	clams	O.M.	organic matter	S.	snails	Di.	diptera
G.	gammarus	L.	lice	M.	mayflies (general)	Ca.	callibaetis
Le.	leeches						

Mean condition factor by age group for rainbow trout, 1998 (n = 90).

age	sample number	mean con fac	std dev	std error
1	54	1.18	0.10	0.01
2	3	1.02	0.15	0.09
3	7	1.15	0.06	0.02
4	11	1.06	0.11	0.03
5	g	1.11	0.13	0.04
6	4	1.14	0.10	0.05
7	2	0.96	0.17	0.12

- Average condition factor for all fish including age 1 = 1.14 (n = 90).
- Average condition factor for all fish except age 1 = 1.09 *(n = 36).*

AGE DETERMINATION COMPLETED BY:

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